Reading and Understanding Political Science:

A Student's Guide to Scholarly Literature

Leanne C. Powner
Leanne.Powner@cnu.edu

Department of Government
Christopher Newport University
1 Avenue of the Arts
359 McMurran Hall
Newport News, VA 23606

Previous versions of this document circulated electronically between 2005 and 2014 under the same title. I would like to thank students and colleagues at the University of Michigan, College of Wooster, American University, and Christopher Newport University, as well as many colleagues elsewhere, for their use of and feedback about this essay.

Abstract

The unusual form of writing called a social science research report can be daunting in early encounters. Fortunately, these papers follow a number of conventions that greatly simplify navigating them and locating important points. This essay proceeds in three parts. First, I introduce a typology of published research papers in political science, of which the empirical research report is a crucial type. Second, I present the five main parts of the standard empirical research report and highlight both what kinds of information are important and where to find it in typical papers. This includes explaining how to interpret both quantitative and qualitative research reports. Finally, I present a series of questions to consider when reading qualitative, quantitative, and formal model research presentations. Using these tools, even novice readers will be able to comprehend published research and evaluate it critically.

Academic social science writing is a unique form of non-fiction. To those not well versed in its style, academic articles in political science and other social sciences can be quite intimidating. We often make reading them into much more work than they have to be. The goal of this essay is to de-mystify academic writing in political science. Articles can be separated by their goals, and we can use this to make generalizations about the purpose and content of articles. Most articles follow a similar format; knowing the format allows you to direct your attention to where it can be most useful and productive depending on your purpose for reading the article. Finally, political science articles frequently use three different methodological approaches: formal modeling, case studies (qualitative analysis), and quantitative analysis. Each highlights a different facet of the question under consideration, and you should know to look for different things in articles written with each type of method.

This essay considers each of those major issues in turn: goals and generalizations, format, and methods. In addition, a corollary goal of this article is to make even complex academic articles accessible to undergraduates in introductory courses. Applying the strategies described here will allow you to read, understand, and even critique almost any piece of published research. Finally, your instructor may ask you to do some activities to practice to the skills and strategies described here.[1] Hands-on application of the techniques and information provided here will go a long way towards increasing your comfort level and familiarity with the genre and how to use it. If you do the activities, you should be comfortable finding and understanding the basic arguments and conclusions of almost any academic article in ten minutes or less.

[1] Instructors may obtain a self-assessment review quiz, student activities handout, student reading guide, and Instructor's Guide from the author on request. As a measure to help preserve the integrity of answer keys, please email one of your syllabi to ProfPowner@leannecpowner.com to request these documents.

Taxonomy of Articles

In general, we can sort articles into groups by the goal of the article. Is this an article to suggest or propose an idea or explanation? To demonstrate or support a theory? Or does it have some other purpose, like providing a review of the literature or making policy suggestions? Once we know what an article is trying to do, we can make certain generalizations about it. How do we establish an article's goals? Three easy sources spring to mind. One is the *sub-headings* within the document, which often provide strong clues. The second is the *authors cited* within the body of the paper, often available in a works-cited or references list at the end of the article. Third, many journals or papers come with ***abstracts***, paragraph-length summaries of the paper and its argument which are usually at the beginning of the article, or, on occasion, in the front of each journal volume. The presence or absence of each of these things can help determine if this is a theoretical article, an empirical paper, or something else entirely. Just a warning: these categories are not hard and fast divisions. Some papers may cross the boundaries; some may contain parts from two or more of the following categories. Some may fit no category at all. But this is a useful classification scheme, or taxonomy, for making a first cut at an article.

Theoretical Articles

These articles are usually *propositional* in nature. They propose or suggest explanations or ways to understand certain events or certain classes of events. (An 'event' would be the 1991 Gulf War; a class of events is 'wars.') They often pose models, either verbal ones or formal ones, to help us explain or understand the causes of this event/class of events. Articles in this group include 'applied theory' articles which interpret a particular event or phenomena from the standpoint of a single theory or theoretical framework—for example, an explanation of the Gulf War from a realist standpoint, or George W. Bush's campaign ads as an example of fear-driven motivators. Third, this

category includes articles that propose a theory or explanation for an event or class of events but do not test it (or try to demonstrate its validity). Many of this group of articles, especially in political economy and international relations, contain **formal (mathematical) modeling**, which involves the use of algebraic expressions to represent and evaluate specific contexts and behaviors.

What do we know about theoretical articles? How do we know one when we see one? Their purpose is to propose explanations or to propose the application of an explanation to a specific case. The most important part of an article proposing an explanation is its **assumptions**, because these are the bases on which all projections of behavior are built. Sometimes, an author's assumptions are not explicit; you will want to look for these as you read. The other important piece of a theoretical article is the 'story' that it proposes: the mechanism that links the actions together. Most theoretical articles outside the 'applied theory' group tell their stories without the use of proper nouns. Instead of talking about Iraq and Saudi Arabia, it talks about 'states'; instead of John Smith and Jane Doe, it talks about 'voters.' They are intended to be broadly generalizeable, rather than confined to one or two specific instances. Modeling articles are identified by the presence of substantial algebra and hypotheses or propositions within the text, which are often set off from the rest of the text by indentation and/or a different font (italics, small caps, etc.). They often contain references to 'utility' or 'rational actors.' (Be aware: some modeling articles proceed to test their hypotheses in the same article, thus crossing the boundary into empirical political science.)

Empirical Articles

Empirical articles often go by the name of 'research report.' The goal of an empirical article is to test or examine the support for hypotheses derived from some theory. In other words, they want to see if what the theorists suggested is what we actually see around us. The key item that distinguishes an empirical article from a theoretical one is that empirical articles try to establish or

deny a **causal inference**—they try to *explain* why or how some class (or sub-class) of events occurred or turned out the way they did. The factors that the researcher thinks contribute to an explanation are called **independent variables**; the outcomes being explained are the **dependent variable** since the author thinks that these outcomes were affected by the presence or absence of the independent variables. Variables are linked in a **hypothesis**, which is a specific statement of what the researcher thinks will happen to the dependent variable when the independent variables change in different directions.

Empirical articles sometimes use **case studies** of specific events, which look at the key variables in which the researcher is interested using in-depth investigations of a small number of cases. These are often referred to as '**small-n**' studies: they usually use more than two cases, to get away from being simply an applied theory article, but rarely more than five. The investigator tries to provide support for his or her hypothesis by showing how the critical variables mattered in specific instances by weaving a story showing these variables in action, with an (implicit or explicit) argument that this theory can then be generalized to other cases meeting the same selection criteria. The **data**, or pieces of information, in these articles is **qualitative**, meaning that it is a descriptive characterization of the evidence, rather than statistical support (see below). Case study articles are a common feature of comparative politics, since they have a major advantage of flexibility in how variables are measured. Imagine that we want to investigate the influence of political engagement on the success of anti-poverty programs in two different countries. In a country that is democratic and poor, we might look at social networks, newspaper readership and voting, but we might look at church membership, party membership, and union membership in a country that is Communist and poor. Voting and church membership don't have the same meaning in both countries, but we might be able to argue that looking at all three of our indicators in both countries will give us a comparable measure of the same concept, political engagement.

Another large group of empirical articles uses statistical techniques to produce estimates of causality. Like theoretical modeling articles, these **quantitative** research articles frequently contain explicit hypotheses (again often offset or in a different font), but they also include large tables in which various values are reported for different variables, models, or parameters. The values in the table represent the output of complex statistical procedures and often tell 'how much' (in a specific kind of way) effect the various explanatory (independent) variables have on the outcome or dependent variable. These types of investigations are common in international, comparative, and American politics research. A world politics independent variable could be 'GNP of the country in the year the war was started'; this is available for any country since about 1945. An American politics dependent variable could be, 'voted Republican, voted Democrat, voted other, didn't vote,' which we could collect rather easily from survey respondents. A comparative politics variable could be whether a political party's platform strongly supports, somewhat supports, somewhat opposes, or strongly opposes a particular policy proposal. D**ata sets** containing this type of information are often publicly available on the Internet, along with the **codebook** you'll need to interpret the data values. Data sets can be the results of surveys, with each case (or 'event') being an individual respondent, or they can be information collected from secondary sources on the specific events that make up a class of events. Since the data sets contain so many cases, rarely fewer than a hundred for world politics and a thousand or more for surveys, we commonly call them '**large-n**' studies.

If you are unfamiliar with statistics, don't worry. Despite the high number of statistically-researched articles in journals, many political scientists are not highly literate in statistics. Journal editors know this. Good statistics-using articles will be so well written that you can understand the argument and the findings without even looking at the tables. If you do indeed choose to look at the tables, which provide both a much more succinct summary and more detailed information on the results, the shortcut is to look for the asterisks, which indicate *statistical significance*, or how sure the

author is (statistically speaking) that the answer he found was not just generated by random fluctuations in the data. In general, the more stars, the more significant – the more surely non-accidental – the value is.[2]

The important thing to look for in an empirical article is the causal connection – the explanation or **theory** – that the author proposes to link the explanatory and outcome variables. This is true for any empirical article, no matter the analytical technique (quantitative or qualitative). What's the 'story' that the author argues for why these variables *should* be expected to be related? Is that story credible—does it make sense in light of other research and basic knowledge? Then, look for which variables the study actually finds to matter (i.e., are statistically significant or are well supported by the case studies). Do the variables the author was expecting to matter actually matter? If not, why not? Do the variables that other authors have commonly found to matter still matter? If not, why not? Is the researcher's 'story' supported by the data?

Other Published Items

Journals also publish other types of material, including literature reviews and book reviews. **Literature reviews** examine a large body of research on a specific issue, topic, concept, or class of events. They try to summarize the current state of knowledge about what matters in explaining or understanding that issue, and usually also attempt to indicate weaknesses in the literature and areas where more research is needed. Unlike theoretical articles and empirical articles, respectively, they do not usually try to propose or test explanations: they only discuss the potential explanations proposed or tested by others. Good literature reviews of 'hot' fields are in the *Annual Review of Political Science*, and many journals publish one or more in each issue. They can serve as excellent sources for

[2] The next part of this essay discusses reading and understanding these articles in more depth.

research ideas, and their bibliographies can help you find initial sources to consult on a research project.

Book reviews serve a similar function. They usually look at a single book, though some journals publish short essays reviewing several books on a common theme. The book review author summarizes the book's argument, approach, and findings, then address what shortcomings the review author thinks the book has, if any. Before you read an entire book for a research project or a class, a brief JSTOR search for book reviews can save you a lot of time by helping you eliminate irrelevant or less-relevant material. Both literature and book reviews can usually be identified by the word 'review' in the article title, listing in a special section of the table of contents, or most frequently for book reviews by the citation of the book at the top of the article.

Another type of article is frequently found in the semi-popular, semi-academic literature characterized by the journals *Foreign Affairs*, *Foreign Policy*, and sometimes *Political Studies Quarterly*. These articles are frequently **normative** rather than empirical or theoretical: they argue *should*, rather than *is* or *might*. They are often written with policymakers in mind, giving suggestions for policy based on the author's particular assumptions about the way the world works. Many times the suggested policy has its roots in some academic theory. We can say in general that these articles are characterized by the presence of a thesis, or central general argument, but they do not attempt to provide scientific academic support for it, only information based on the specific case they are discussing. Prescriptive articles like this tend to be very similar to other articles in *Foreign Affairs*, *Foreign Policy*, and often the *Bulletin of the Atomic Scientists* which are story-telling essays giving substantial background or detail about some event or controversy. They may make some references

to theories or arguments in political science or present a lopsided or slanted view of the situation, but essentially they are factual accounts with no obvious thesis or argument of their own.[3]

Format and Organization of Empirical Articles

In most political science programs, empirical books and articles will dominate the reading list for upper division classes, so it is worth your time to understand how these articles are organized and the structure of the arguments they make. While the sections of any given article may not necessarily be named as listed below, most research articles follow this general format and almost all will include these parts.

Almost all mainstream journals publish abstracts of their articles. They are usually at the top of the first page of the article, though in some journals they may take the form of an expanded table of contents at the front or back of the issue. **Abstracts** are paragraph-length summaries of the article's main arguments, research design, and findings. When reading an article for a class, or considering an article for a research source, the abstract is a quick and easy way to gather the critical points and evaluate if the article is valuable for the purpose you intend. Sometimes the best-titled articles, or ones that contain all your keywords, actually have very little to do with your argument—why waste time reading the entire article if you could have learned that from the abstract? When reading an article for a class, the abstract acts as a guide, telling a reader what the article is about in more detail than a title could, and it helps to prime the reader for what the rest of the article will argue.

[3] Of course, many other types of articles appear in journals each year. The *American Political Science Review* in particular often includes a methodological article or two in each issue. These articles look at how a specific statistical method or modeling concept or use of sources improves on past tools or methods. The goal of these articles is less about the substance, the *what*, of the phenomenon under investigation as it is about the *how* of the testing itself.

The article's introduction provides useful information about the question the article tries to answer and the approach the article will take to answering it. The purpose of the introduction is to inform the reader what the author is investigating, and to a certain extent to convince the reader that this topic (and more importantly this approach to answering it) matters for enhancing understanding of that topic. It will identify the broader **research question,** or family of general themes, that this specific investigation helps explain or explore, and it will usually give a summary explanation of the author's theory. The introduction always closes with a structure sentence or sometimes an entire structure paragraph, which outlines the sections that will follow and usually says something about the research framework used to study the question.

The second major section of an empirical article is the **literature review**. In this part of the essay, the author tries to situate the specific question he or she is looking at in the context of broader questions being asked in the research community. It will discuss what other researchers working in this field on similar questions have learned. The author will also try to bring in other relevant literatures from other disciplines like psychology, business, or history. Sometimes, the author will discuss why he or she thinks these investigations were flawed or incomplete, and how this investigation will remedy those flaws or weaknesses. The goal of this section is, in its shortest form, an effort to provide support from other research that the author's *theory* is correct, and thus that the hypotheses proposed are reasonable in light of what we know about how these variables are likely related.

The research design section is normally third, and is often broken up into subsections or sometimes two different major headings. This part of the article contains information about two major topics: the hypotheses and the variables. Where a theory tells us *how* the variables are connected (the causal mechanism assumed between them), a hypothesis tells us *what* relationship the author's theory expects to find between the variables. Some example hypotheses might be, "As

tension in a dyadic relationship[4] increases, military spending should also increase," or "Declining salience of racial issues is expected to result in fewer pro- or anti-affirmative action efforts by a voter." Each of those statements makes a specific expected relationship between some cause and some effect. As discussed briefly above, the cause is usually the explanatory or **independent variable**, and the effect is the thing we're interested in studying, or the **dependent variable**. The author is interested in explaining changes in the dependent variable by looking at changes in the independent variable(s) he or she is interested in.

After identifying the expected relationships, the author faces another problem. How can she measure "salience of racial issues" or "dyadic tension"? If I want to be able to look at changes in them, I have to have some characteristic or criteria that I can look at across all the cases. Often, the hardest part of designing research is the **measurement problem**: how do I find something about my cases that actually measures the thing I'm interested in? Finding a specific thing to use as a proxy or measure for the abstract concept the author wants to discuss is a major issue no matter whether the author is using qualitative data or quantitative data. This process is often called '**operationalizing**' the variables. One might argue that dyadic tension could be **coded**[5] by looking at news articles in, say, *The New York Times*, by giving references to conflict or uncooperative behavior a negative value and references to cooperative behavior or good relationships a positive value. Add them up for each year and give a dyad-year a summary value of 1 (low tension/good relationship) if the final sum is positive, a –1 (high tension/bad relationship) if the final sum is negative, and a 0 if the sum was 0 (neutral dyadic behavior).

That sounds all well and good, and we're ready to go on, right? Wrong. The measurement strategy outlined in the previous paragraph has several major problems. Does that coding strategy

[4] "Dyadic" means "pairwise"—dyadic studies look at pairs of countries as a unit. So one observation in this study might be the tension level in the United States-Canada level in 1998—a unit known as a 'dyad year.'
[5] Coding is the process of turning information (facts) into data (numbers or other specific qualitative values such as high-medium-low) that we can compare across cases.

actually capture the level of tension in the dyad, or is it capturing something else? Most scholars would say that it captures instead the *NYT*'s regional biases, and news biases in general. Africa, for example, does not get good coverage in pretty much any major (American) paper; neither does Micronesia. Some countries aren't mentioned more than once or twice in a year – Pelau or Lesotho, for example. Those countries might get final codes that are incorrect because we don't have information about all of their dyadic relationships. When was the last time you saw a news article about Burkina Faso-Chile relations, or relations between Belize and Kazakhstan? Our dyad-year data set would have a lot of 0's simply because the *NYT* doesn't publish that many articles about some of these dyads, rather than because those states truly have neutral relationships. Also, news articles very rarely focus on positive things. We're more likely to see an article published about threats or attacks than we are treaties or agreements. So while counting news articles looks at first like a reasonable way to 'measure' dyadic tension, it really might give us a lot of wrong values, which would then tilt or **bias** our analysis away from the 'true' relationship towards one that's really just an artifact of how we measured the things that interested us.

Because measurement is such a critical facet of empirical investigation, the research design section will almost always include information on the author's measurement strategy as well as the sources the author used to collect the data. Some information, like gross national (or domestic) product (GNP or GDP), is publicly available from a variety of sources; data for other variables may have come from data sets compiled by other researchers and made publicly available through organizations like ICPSR, the Inter-University Consortium for Political and Social Research, which is a large data set repository housed at the University of Michigan. Sometimes authors will post data sets for their articles on their personal web pages, or include an email address for others to inquire about making use of the data. Collecting data is expensive, so many times authors will use information collected by someone else with a similar purpose or interest. Finally, the research design

section may also contain information on **case selection**, or how countries, events, or people got picked to be part of the data set, and it will usually identify the mode of analysis. Will the author present case studies, use a regression to examine broader patterns in the data, or something else entirely? Often, the author will justify the choice of mode of analysis.

The fourth major section of a research report is where the author does the analysis and presents the results. If this is a quantitative study, this section will contain tables showing the results of the statistical analysis listing each independent variable and its associated effect (more on this later). If the article uses qualitative techniques, this is where the author will present the cases and identify their salient features. Regardless of methodology, this part of the article is where to look to see if the data support the author's theory. The researcher will normally go through each hypothesis or each major explanatory variable and discuss the results.[6]

Finally, the conclusion of the article tends to contain a summary of the research question, the hypotheses, and the findings. It will usually contain brief statements about any surprises that the research found, any inexplicable cases, and/or weaknesses of the model or theory used. They also usually contain a paragraph or two at the end which discuss where research in this field should go, or further questions or potential hypotheses that this article suggests. This idea of building future research on prior work is how the field develops knowledge about the things that we study. We test and re-test arguments in different forms on different sets of data, with each successive article building on work that came before and attempting to improve upon it.

A few more general comments about reading articles are in order. First, many scholars of political science suggest that you approach articles for classes by reading first the abstract, the introduction, and the conclusion (with a quick skim of the references list), and then going back and

[6] Two important points to note, especially if you are going to be writing or talking about the articles you read. First, the word *data* is plural (its singular form is *datum*). Second, data go in and results come out. In many articles, especially quantitative ones, you do not ever see the author's data. You only see the results of their analysis.

reading straight through from the last paragraph of the introduction to the end of the conclusion. This way, your brain is primed for the argument the author is going to make before you begin your critical reading. Second, section headings and the references (works cited) list can tell you a lot about the article's orientation to the question it's trying to answer. A literature review sub-titled "The Irrelevance of Money" gives a rather strong hint of what that section argues. At the beginning of your studies, the authors' names in the reference list are largely meaningless to you, but this will change with time. In even your first courses, though, you should look for citations to any other authors you're read for that course; by your second or third year of political science study you'll have begun to learn who the major scholars or researchers in your field are.

What to Look for and What It Means

Journal articles require active reading. If you just flip through them and absorb the facts the author presents, you'll be missing the whole point of the article. Good readers will learn to engage themselves with the literature, reading and critiquing and commenting in an intelligent manner. Journal articles are most commonly read with a pen or pencil in hand for making marginal comments rather than a highlighter for indicating key facts. Many readers develop annotation schemes for journal articles to help them locate critical information. I, for example, indicate assumptions with checkmarks and conclusions with asterisks, while important pieces of theory, logic, or evidence get a vertical line on the side (more lines means more important).

This section is roughly arranged in order of increasing complexity and covers only the most frequent types of articles assigned in undergraduate political science courses – qualitative analysis, quantitative analysis, and formal modeling.[7] After reading each segment, you should be comfortable

[7] Policy articles, literature reviews, and applied theory articles are generally straightforward.

reading articles of that type critically, at least in a basic manner. Articles may look intimidating, but almost all published articles are truly accessible to freshmen in their first political science course.

Case Studies

In a case study or qualitative empirical article, authors present a small number of cases (2-5) in great textual detail. Students and instructors often see these articles as the 'easiest' kind to read and understand, since the whole argument relies on the author's ability to present the material in plain English. Unfortunately, undergraduate students tend to come away from these articles with pages of factual notes about the cases rather than any specific sense of what the author's argument is. This is typically because the dependent and independent variables and hypotheses are not often indicated in a prominent manner; the reader must infer from the discussion of the theory. Variables are usually identified by characteristics/facets of the case that are recurring between the cases. In qualitative research, variables might take on values like 'high, medium, low,' 'before, after,' 'deceitful, critical, ignorant, neutral, impressive,' etc. – things that are not easily, or often appropriately, turned into numbers for statistical analysis.

When reading these articles, some key questions to think about might include:

- Do the cases selected seem reasonable for the theory? Think about other cases where the theory should apply. Does the author's argument seem to explain your new case, or does it have large holes or appear inapplicable?
- Why is the author using these cases? Do these cases represent a "hard" test for the theory, where it would not be expected to do well, or an "easy" test where we would expect the theory to apply well?

- Do the facts the author presents to 'measure' the variables actually seem to be measuring what the author claims they are? Examining wastefulness of legislative office spending by tallying the amount of office paper recycled by the legislators' offices might actually capture staff members' tendencies toward environmentally friendly behavior rather than wasteful spending by legislators. Coding racial tension in a high school by looking for racial slurs in bathroom graffiti may overestimate by catching attitudes that no longer exist, or by catching instead the lack of interest students have in their classes.
- Does the author present a credible effort or critical evidence to demonstrate that alternate arguments (identified in the literature review or elsewhere) are not correct? Are there other plausible explanations, grounded in other theories, which might produce the same set of facts and outcomes but for different reasons? Draw on material from other classes and other readings.
- Is there variation on the presumed dependent and independent variables? In other words, if the author is trying to explain cooperation by claiming it results from a certain interest configuration, does the author also examine cases of non-cooperation to see if those interest configurations were not present, or cases where that configuration was present and cooperation didn't happen? Looking at only cases that support the theory is not normally a strong or rigorous test of that theory.
- Is the overall argument believable? Do the cases presented support the author's theory?

Quantitative Articles

More formally, the research tool used in political science is a branch of statistics called **econometrics**. This kind of statistical analysis is designed to look at relationships between variables where the cases may or may not be randomly selected, or where the variables themselves might be related to each other. For example, age and gender are related in some types of survey analysis: at the higher end of the age spectrum, respondents are much more likely to be women than men since women live longer. The more people a country has, the higher its gross domestic product: a country of 20,000 people cannot plausibly earn as much as one with 200 million people, and a country of 200 million almost certainly earns more than many smaller ones even if most of its residents are desperately poor.

The primary tool used in econometrics is the **regression**, or more particularly, the ordinary least squares (OLS) regression. In its simplest form, a regression tries to predict the change in the dependent variable that we would see if the independent variable was increased by one unit. The values normally reported in the article concern the **coefficients** for each independent (or 'right hand side') variable. You can think of these coefficients as the slope of a line – just a slightly more complex version of that $y = mx + b$ formula that you learned in Algebra class. The coefficient tells us how much change in our dependent variable we can expect, *on average given the data that went into the model*, for a one-unit increase in that independent variable.[8] The tables in the article list each independent variable in the model and its associated coefficient. Just as in that Algebra formula, we

[8] This method of interpretation works only for regression models. Coefficients for **probit**, **logit**, and other models require somewhat more complicated methods to convert them into dependent variable values. Probit and logit allow researchers to examine the effects of independent variables on the probability that some event will occur, and because of this, we cannot compare the raw coefficients to one another. Again, coefficients are best understood by looking first at the signs—the direction of the relationship – and then secondly at the relative 'sureness' of that sign.

can multiply each coefficient by its independent variable value, add those up, add the value of the constant (*b* in the Algebra class formula), and obtain a (predicted) value for the dependent variable.[9]

Regression is a very useful tool for political scientists. We can use it to study everything from survey results about race and gender in politics to the density of union membership across countries to the effect of military spending on war involvement. To use econometric tools like regression, we have to have a substantial number of **observations** or cases to put in a data set, with a minimum of about 20 for most topics if we want reliable results. Each observation is one occurrence of the thing we want to study, sometimes known as the **unit of analysis**.

When you read an econometrically-tested article, many of the technical terms will be foreign; most of the time, you really don't need them. In the majority of instances, you are reading the article to grasp the author's argument rather than absorb the details of their testing method. While reading, you might want to think about some of the following questions, which focus on how the data used for the test relate to the argument, and whether the theory and hypotheses make sense given other things you know or the author reports.

- Do the variables that the author includes actually seem reasonable to include? Is there a theoretical reason to include them in this analysis?

A number of variables are related to or help predict fluctuations in the stock market indices. For example, a statistically significant relationship exists between me eating cornflakes for breakfast and movement in the Dow Jones Industrial Average. When I start my day with cornflakes, the DJIA is very likely to go up. Statistical tests indicate a very low probability that, *given the data I fed into the*

[9] Because the social world is not quite as cooperative as the Algebra class formula, our predicted value does not always match the observed dependent variable value. This gap, known as the *error* or *residual*, is an expected fact of life. Econometric models are designed to handle this not-quite-perfect prediction; it's the source of the confidence interval (uncertainty range) around each coefficient. If you're really curious about this, ask your professor for more details.

analysis, the relationship I found between my breakfast and the DJIA is just a fluke and that the true relationship is zero.[10] However, stop and think about that for a moment. I am an insignificant nobody out in the middle of nowhere. Would it make any sense that what I eat has a real effect on the DJIA? I think not. In the research design portion of the article, the author should have given some type of theoretical justification for the inclusion of each variable.[11] Do you believe it or agree that this variable might be a useful thing to include?

- What signs (+/-) does the author's theory predict the coefficient of each variable should take? Is this what the analysis actually finds?

Variables are included in an analysis because the author thinks they are, or should be, related to or good predictors of the phenomenon of interest. The *sign* of the coefficient is actually the most important thing to take away from the analysis. For some variables, the author expects to find a **positive (or direct) relationship**. As the value of the independent variable increases, we expect that the dependent variable increases as well. For example, the effect of age on likelihood of voting (in the United States) is normally expected to be positive: The older you are, the more likely you are to

[10] That's what *statistical significance* means: that we are reasonably sure that the relationship is not just a fluke. Imagine flipping a coin. If you flipped it twice and got heads both times, you'd probably think nothing of it – you'd think that the sequence of [heads, heads] was just a fluke. If you flipped it 20 times, or 100 times, and still kept getting heads every time, then you'd be reasonably sure that the pattern is not a fluke: the coin is weighted so that it always comes up heads. For regression and other econometric models, the equivalent to determining that the coin is weighted is to be reasonably sure that the sign of the coefficient is right.

[11] Sometimes, justifications for what are known as '**control variables**' are omitted. Control variables are ones that are generally agreed to have an effect, and moreover, are generally agreed to affect the dependent variable in a specific way. They are included in a statistical analysis to make sure that the things we're interested in do not get reported as 'explaining' part of the story that we already know is explained by these other things. In survey analysis, these are often items like gender, race, income, partisan affiliation, etc. World politics might use GDP/GNP, being a 'democracy,' geographical contiguity, etc. Authors also use '**dummy variables**,' which are on-off variables which can only have values of 0 or 1. (Someone once told me the name is because we're too dumb to be able to find a better way to measure these concepts.) These variables are trying to help examine the results of questions with 'yes/no' kinds of answers.

vote.[12] Other variables have a **negative (or inverse) relationship**. We expect that as the independent variable gets larger, the dependent variable will decrease. A good example is the effect of democracy on going to war. The more democratic a country is, the less likely it is to start a war. (Use Figure 1 to visualize those relationships and be sure that you understand how they work.)

[FIGURE 1 ABOUT HERE]

As the author discussed each variable, he/she should have made predictions about its expected behavior. For key variables of interest, these are often spelled out explicitly in formal hypotheses. When you read, it's a good idea to jot down the variable names and predicted signs so you can compare them with the results.

- What coefficients are statistically significant? What variables have substantive significance? Are the coefficients on the author's key independent variables significant?

The tables reported in an econometric article often have asterisks by some values. Asterisks are a shorthand way to indicate the level of statistical significance a coefficient has. Statistical significance tells us how sure we can be that the sign of the coefficient – positive or negative – is correct. It incorporates information from the residuals to produce a confidence interval, a range of values where the computer's best guess of the true relationship lies. If the confidence interval includes 0, then we cannot be sure what the sign of the coefficient is: It could be on either side of 0, either

[12] Note that this could also be interpreted as a negative direct relationship—as age goes down, likelihood of voting goes down. But since regression tells us the expected change in our dependent variable for a one unit *increase* in the independent variable, we normally rephrase the relationship to reflect increases in the independent variable.

positive or negative, so the estimate we obtained for the coefficient is not trustable. In short, we are looking for our coefficients' values to be far enough from 0 that we can be sure the sign is correct.[13]

Most authors (rather incorrectly) interpret statistical significance as meaning "this variable is important for explaining the thing I'm interested in." Going back again to the cornflakes and DJIA example, though, we can get all sorts of statistically significant relationships that mean nothing substantively. All statistical significance really means is that we're fairly certain (normally 95% or better) that the coefficient's *sign* is correct—that the coefficient's true value is on the same side of 0 as the value we found. It tells us nothing about the substantive significance of the variable. The only way to gauge substantive significance is via the author's theory.

Even if a coefficient has statistical significance, thinking about the substantive significance is critical. Consider a statistically significant 0.0004 coefficient on the variable "age," where we're trying to explain the extent of a person's political engagement. What does the effect of a change in the independent variable means for the dependent variable? In this case, increasing a person's age by one year results in a 0.0004 increase in the level of political engagement (say, number of political acts committed in the previous year). Does 0.0004 matter much? At that rate, someone who was 100 would commit, on average, 0.4 more political acts a year than someone who was 0.

- Do the findings of the article seem strong enough to support the argument the author is trying to make?

This is a summary question asking you to consider the article and its arguments and make your own assessment. Did the variables the author argued were important for his/her theory actually emerge

[13] How far is "far enough" depends on the size of the errors in the model. Bigger errors (residuals, unexplained parts of the dependent variable) mean wider confidence intervals and so a greater chance of that interval containing 0.

as statistically and substantively significant? Does the analysis seem to account for other appropriate potential causes or arguments? Can you tell another theoretically grounded story, besides the author's argument, using the same relationships the author finds? Are you convinced?

Formal Modeling

Some forms of formal modeling go under the name of rational choice analysis; others are social choice, game theory, spatial models, or other types. These articles all share a commitment to explicit discussion of their assumptions, normally through the precise and international language of mathematics. It is important to understand that these articles present *models*: They do not, and do not claim to, depict reality precisely. Formal modeling allows the researcher to focus on only those specific features or variables he or she is interested in, but normally at a much higher level of intensity or focus than is possible in quantitative studies. Quantitative studies say "variable x influences outcome y," and by the way regression is constructed, the assumption is that this relationship is linear and additive. In formal models the researcher can delve into the exact relationship, and perhaps find that the relationship is multiplicative, exponential, a function of another variable, or anything else.

Achieving this level of focus and this intensity of exploration, however, comes at the cost of reality. The simplifications necessary to construct the model, often in the form of **assumptions**, can be so severe that the behavior predicted by the model may look nothing like behavior as we actually observe it. This is a primary criticism of rational choice modeling in particular, which makes stringent assumptions about actors' levels of information and their decision-making processes. From the outset, you must know that the criticisms do have some validity. The contributions of formal modeling to how we think about problems, however, have been vast, and to many (though certainly

not all) scholars these contributions to refining thinking are sufficient to justify the use of highly abstract models, particularly when the abstract models are then subjected to empirical testing using real-world data.

All a formal model is, then, is a simplified picture of an author's idea of how the world (or some part of it that interests him/her) works, intended to help him/her predict and explain certain behaviors or events of interest. The model fits into a larger research question, just as empirical articles do. The important part of the article is still the substance; never let the method overwhelm the argument in any type of article. Just as with empirical articles, your first step is to identify that broader research question, that stream of literature, to which this model contributes. What kinds of behavior is the model trying to predict? It might be a model of legislative coalition formation, a model of deterrence, or a model of the decision to vote in a specific election.

Your second step is to identify the actors and choices involved in the model. A key reason many scholars use formal models is that such models allow them to consider strategic behavior, where one actor's actions are conditioned on the choices and behaviors of another actor. What is the sequence of moves or choices made by the actors? You might find it useful here to sketch a diagram of who picks when and from what set of options. What factors are presented as being important for the actor's choices or decisions? Again, these are normally a good thing to write down, along with their mathematical symbol-names (if used).

As the earlier paragraph suggested, the assumptions an author makes are critical for the conclusions, so the next step is to identify those assumptions and consider how they interact with the substantive topic the model addresses. I find it useful to separate these into substantive and technical categories, based on whether they are related to the argument's contents or the tools used to find a solution to the model, respectively. So an assumption of a median voter rule or a restriction of choices to yes/no when gradations are available would normally be substantive, while

assumptions of stationarity, a variable normalized from 0 to 1, or quadratic utility functions would be technical.[14]

Once you've established what the author is trying to do and how he/she intends to do it, for most purposes you can skip over the math and the proofs (which traditionally end in "QED"—start reading again there).[15] I do recommend trying to look at it, at least—it's often surprising that almost all the math in the article is no tougher than Algebra II, and at the absolute worst there will be one step of basic differentiation from Calculus I. It's normally also worth looking at and trying to decipher the bottom line of any set of mathematical manipulations, since these are normally the important conclusions. Even if all you can get out of it is a general sense of the relationship expected between the variables (consult your notes for their symbols, and look for things like greater than/less than signs), you're several steps ahead of the game. These bits of math inside the article itself are usually related to any theorems the author is presenting. **Theorems** are logical findings of a model, statements of the logical relationship between two or more variables. **Lemmas**, which authors sometimes present, are intermediate findings on the way to a theorem that are of interest in and of themselves. Theorems (sometimes called propositions) are normally worth noting; lemmas sometimes less so.

The final important part of the model is the equilibrium (plural: equilibria). In many ways, finding the equilibrium is the whole goal of the model, and everything else was just preparatory. An **equilibrium** is a stable set of behaviors or choices, arising under specified circumstances, from

[14] Of course, substantive assumptions have technical ramifications, and technical ones have substantive implications. I still find the categorization to be useful for thinking about the *model* without getting caught up in the model*ing*.
[15] Social scientists cannot *prove* any of their arguments. The nature of the world simply does not permit definitive proof of an argument by empirical testing against the real world; the most we can offer is support for or against a hypothesized relationship. The word here is used in the sense of a mathematical proof, in which the author gives a highly technical presentation of the necessary steps of logic to the effect that, if you accept the starting assumptions, the conclusion is the only logical outcome. Thus the proof is entirely an exercise in the logical and the hypothetical, not an exercise in demonstrating any relationship with reality. If your technical background isn't that strong, feel free to skip the proofs entirely. Proofs are increasingly relegated to technical appendices at the end of an article, rather than being embedded in the text.

which deviation by any actor is not logical. In other words, these are the predictions of behavior. The equilibria are often thought of as the 'solution' to the model and are normally the part of the model subjected to empirical tests. After reading a modeling article, you should come away with a sense of the logic – the sequence of steps – behind the equilibria, at least at an intuitive level. These predictions of behavior form the central basis for why we model: Modelers argue we can overlook unrealistic assumptions in how the predictions are generated if the model does a better job of explaining or predicting behavior than other forms of investigation.

When reading a modeling article you might want to think about some of the questions below. Don't worry if you find it a challenge to follow the specifics; go for the big picture. If you begin to grasp some of the specifics so that your interest is piqued, or if you find even the big picture a substantial challenge, it may well be worth setting up an appointment or an office hours visit with your instructor for some one-on-one explanation and assistance. Modeling often looks much more intimidating than it actually is. Always remember not to let the method overwhelm the substance. A formal model is really nothing but logic wrapped around substance, an argument in fancy packaging. The reaction "Oh no, there are Greek letters in my politics homework!" is a sign that you need to take a deep breath, step back and look for the forest instead of focusing on the trees and the dark, scary places beneath them.

- What variables, factors, or alternative explanations are omitted from this model? Does the author justify these choices? How does the author's proposed explanation differ from/appear similar to other models or arguments in the literature?
- Does the 'story' the author presents in the model make sense, in light of your understanding of the phenomenon of interest? In other words, is the argument about how decisions occur (or events happen or choices are made) plausible?

- Do the equilibria of the model seem to correspond to behavior patterns observed in the real world? Does the author offer an analysis of how well the model predicts? Authors increasingly include at least a short empirical test or discussion to help make the case that their equilibria actually do reflect real-world processes.
- Are there any variables in the equilibrium whose values are critical to the eventual outcome? Are there any critical points in the range of values a variable can take on that dramatically affect the equilibria?
- If you are more comfortable with modeling, logical analysis, or other forms of research similar to formal models, you might want to consider thinking about the implications of the substantive assumptions. Does the argument hold for other possible assumptions? Or does a minor change of assumptions drastically change the model's expected outcomes?

Conclusion

Scholarly articles in political science take several forms. The most common one you'll encounter in your studies is the empirical research report. These papers follow a standard five-part format that allows for easy navigation. Scholars use quantitative and qualitative analysis techniques to test hypotheses about relationships derived from theories. In all types of empirical articles, focus on the theory, the way variables are measured, and the strength of the author's findings. When reading formal models, focus on the big picture: the story the model tells of how actors interact, key points at which the outcomes can change, and the equilibria or other predictions.

Reading and Understanding Political Science
Quick Summary

Key Points

- Articles have different functions. They may explain (theoretical), illustrate (applied theory), summarize (literature or book reviews), or test (empirical).

- Empirical articles may use quantitative or qualitative methods to test hypotheses. The different data types cause authors to use different methods of investigation, but the goal of testing hypotheses remains the same.

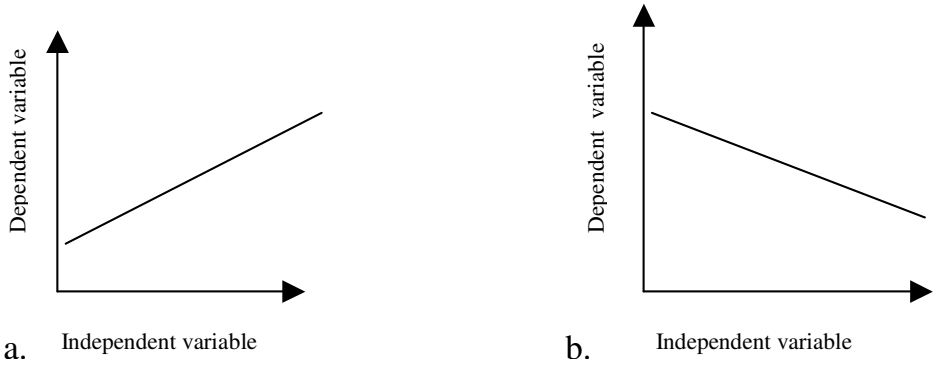
- Empirical articles generally follow a consistent five-part format: introduction, literature review, research design, analysis, conclusions. Many contain a summary abstract at the top of the article.

- Formal modeling is the use of mathematical language to analyze political situations. The author begins with a set of assumptions about the key actors, stages of interaction, options at each stage, and factors affecting the value of outcomes. She then uses mathematical language to express the relationships between these components. Rearranging these terms using the rules of math allow the author to discover new relationships between concepts or components.

Terms to Know

abstract
assumption
bias
book review
case selection
case study
causal inference
codebook, coding
coefficient
control variable
data
data set
dependent variable
dummy variable
econometrics
equilibrium
formal modeling
hypothesis
independent variable
large n
lemma
literature review
measurement problem
negative/inverse relationship
observation
operationalize
positive/direct relationship
probit, logit
qualitative
quantitative
regression
research design
research question
small-n
theorem
theory
unit of analysis

Figure 1. Positive (a.) and Negative (b.) Relationships



Resource 1: Student Self-Check Quiz (Available from the author by instructor email request OR may be included in the published version if space and interest exist)

Reading and Understanding Political Science:
The Check-Up

Use this quick quiz to determine how much of *Reading and Understanding* you really understood.

1) Which of the following is not likely to be a research question or research program?
   a) Legislative behavior (how legislators choose to vote or campaign)
   b) The democratic peace (why democratically governed countries don't fight each other)
   c) Electoral systems and representation (how election structures reflect voters' interests)
   d) The role of Ross Perot in the 1992 US Presidential election (a third party candidate with an eclectic political platform)

2) The purpose of empirical research is _____.
   a) to propose explanations for events or behaviors.
   b) to provide detailed descriptions of events or behaviors.
   c) to test proposed explanations using data.
   d) to create an abstract model of behavior.
   e) to recommend or support a particular policy response.

3) Which of these hypotheses represents an *inverse* relationship?
   a) When education increases, birthrate declines.
   b) When social welfare spending decreases, trade union membership also decreases.
   c) When civic engagement increases, voter turnout goes up.
   d) When the military budget increases, the probability of war does not change.

4) True or False: Empirical research always requires the use of math. TRUE FALSE

5) Which of these is **not** a piece of information you should take away from a modeling article?
   a) Where the author is a professor.
   b) What the equilibrium/ia of the model is/are.
   c) Key substantive assumptions related to the model.
   d) Who the actors are in the model.

6) Researchers must be careful that their methods of _____ do not introduce bias into their _____.
   a) research, measurement problem
   b) data, analysis
   c) measurement, data
   d) analysis, dependent variable

7) If a variable is statistically significant, it is _____ substantively significant.
   a) always
   b) sometimes
   c) rarely
   d) never

8) True or False: Arguments about causality are about which independent variables influence the dependent variable. TRUE FALSE

Resource 2: Activities (Available from the author by instructor email request)

Reading and Understanding Political Science
Student Activities

The activities below accompany "Reading and Understanding Political Science" (AUTHOR YEAR, "R&U" for short). Activities are organized by their corresponding section of the essay. Complete the activities after you finish reading each section.

Theoretical Articles

Activity 1: Brainstorm a list of classes of events that are relevant for your subfield of political science (world politics, American politics, comparative politics, etc.). For three or four of these classes, identify several specific events that would be part of that class. Pick *one* of your classes of events and use JSTOR or another article database to find a theoretical article about it. (Turn in the full citation of the article and your brainstorm lists.)

Bonus 1: An election can represent both an event and a class of events. Can you figure out how? (*Hint:* What does the outcome of an election represent?)

Empirical Articles

Activity 2: Use JSTOR to locate Kate O'Neill, "Regulations as Arbiters of Risk: Great Britain, Germany, and the Hazardous Waste Trade in Western Europe," *International Studies Quarterly* 41,4 (1997): 687-717. Identify the dependent variable, the independent variable(s), and the hypothesis/es. How were cases selected to be included in the analysis?

Bonus 2: *R&U*'s example used a decision to vote Democratic or Republican as a dependent variable. Think of a potential research hypothesis in which voting Democratic or Republican is an *independent* variable. What would be your dependent variable? What kind of potential survey question would you need to ask or find data on to measure that dependent variable?

Other Items

Activity 4: Locate Steven Sanderson's article in *Foreign Affairs, "*The Future of Conservation." What is the author's normative argument, the 'should' statement that is suggested? Who might be the intended audience for this essay? What evidence or arguments does the author give to try to persuade the reader that the suggested policy direction is best?

Format and Organization of Empirical Articles

Activity 5. Measurement

A. How could we measure something like dyadic tension, the salience of racial issues, or the independence of judicial officials in different countries? Pick one and propose two measurement strategies, qualitative or quantitative, that would capture some aspect of it in a fair or relatively unbiased manner. Where would you find the information? What information would you look for? You may need to defend your choice of sources or operationalization.

B. Would counting the number of people at affirmative action rallies in four towns over a year be a good measure of 'affirmative action' actions taken by each of those towns that year? What actions might that measurement strategy be missing?

Activity 6. Observations
For each of the three examples in the essay – surveys on race and gender, comparative union density, and military spending – what is the unit of analysis? Try to name three or four other potential hypotheses or theories, and name an appropriate unit of analysis for each.